Precalc Warm Up # 6-1

Find the following without using a calculator or your unit circle. Just use special triangles. Spend a few minutes memorizing them!

$\sin 30^\circ =$ $\sin 60^\circ =$ $\sin 45^\circ =$

$\cos 30^\circ =$ $\cos 60^\circ =$ $\cos 45^\circ =$

$\tan 30^\circ =$ $\tan 60^\circ =$ $\tan 45^\circ =$

Cosine stands for "Complements Sine". Why do you think that is?

HW Questions: p. 319

In Exercises 1–8, find the point (x, y) on the unit circle that corresponds to the given real number.

3. $t = \frac{5\pi}{6}$

5. $t = \frac{4\pi}{3}$

In Exercises 9–20, evaluate the given trigonometric function.

11. (a) $\sin\left(-\frac{\pi}{6}\right)$

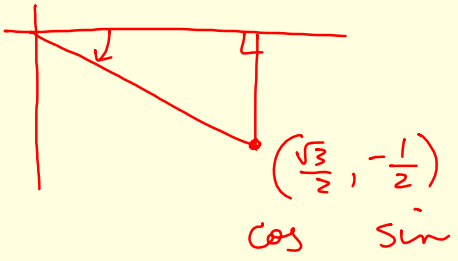
(b) $\cos\left(-\frac{\pi}{6}\right)$

(c) $\tan\left(-\frac{\pi}{6}\right)$

17. (a) $\sin\frac{11\pi}{6}$

(b) $\cos\frac{11\pi}{6}$

(c) $\tan\frac{11\pi}{6}$



In Exercises 27–34, use the periodic nature of the sine and cosine to evaluate the given trigonometric function.

27. $\sin 3\pi$

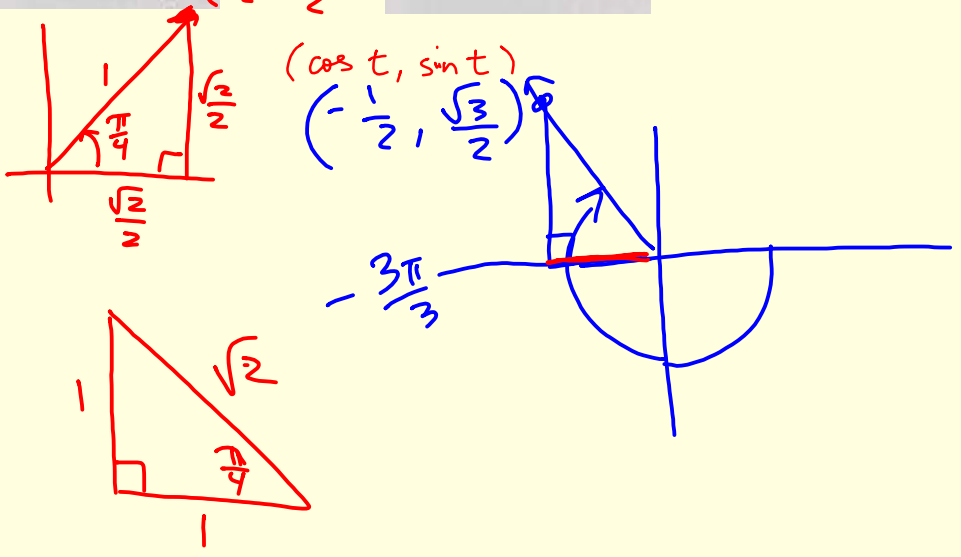
31. $\cos\frac{19\pi}{6}$

33 $\sin\left(-\frac{9\pi}{4}\right)$

In Exercises 21–26, evaluate (if possible) the six trigonometric functions for the given value of t.

21. $t = \frac{\pi}{4}$ $\left(\frac{\sqrt{2}}{2}, \frac{\sqrt{2}}{2}\right)$

25. $t = -\frac{4\pi}{3}$



In Exercises 35–38, use the value of the given trigonometric function to evaluate the indicated functions.

35. $\sin t = \frac{1}{3}$

(a) $\sin(-t)$ (b) $\csc(-t)$

37. $\cos(-t) = -\frac{7}{8}$ adj/hyp

(a) $\cos t$ (b) $\sec(-t)$

In Exercises 39–50, use a calculator to evaluate the given trigonometric function. (Set your calculator in radian mode and round your answer to four decimal places.)

41. $\cos(-3)$ ≈ 0.98999

43. $\tan\frac{\pi}{10}$ -0.9900

47. csc 0.8 → Sin 0.8 x^{-1}

$\sin 40^\circ = \cos$ 50°

$\cos 12^\circ = \sin$ 78°

$\sin\frac{\pi}{3} = \cos$ $\frac{\pi}{6}$

$\cos\frac{2\pi}{5} = \sin$ $\frac{\pi}{10}$

$\frac{5}{5}\cdot\frac{\pi}{2} - \frac{2\pi}{5}\frac{2}{2} =$

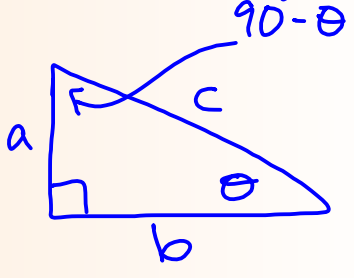
Prove $\sin\theta = \cos(90^\circ - \theta)$

$= \frac{a}{c}$

$\sin\theta = \sin\theta$

This is called an Identity since it is true for all θ

Let:



Other identities...

Find to 2 dp:

$\sin 12^\circ + \cos 12^\circ \approx 1.19$ $\sin 159^\circ + \cos 159^\circ \approx -0.58$

Note: $\sin^2\theta = (\sin\theta)^2$

$\sin^2 12^\circ + \cos^2 12^\circ = (\sin 12^\circ)^2 + (\cos 12^\circ)^2 = 1$

$\sin^2 159^\circ + \cos^2 159^\circ = 1$

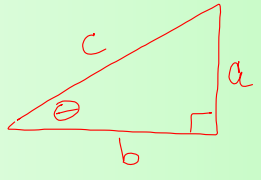
$\sin^2\theta + \cos^2\theta = 1$

How can we prove it?

$\sin^2\theta + \cos^2\theta \stackrel{?}{=} 1$

$(\sin\theta)^2 + (\cos\theta)^2 \stackrel{?}{=} 1$

Let:



$\left(\frac{a}{c}\right)^2 + \left(\frac{b}{c}\right)^2 \stackrel{?}{=} 1$

$\frac{a^2}{c^2} + \frac{b^2}{c^2} = 1$

$\frac{a^2 + b^2}{c^2} = 1$

by Pyth. Th. $\rightarrow$ $\frac{c^2}{c^2} = 1$

$1 = 1$ ✓

Reciprocal identities, tangent and cotangent identities.

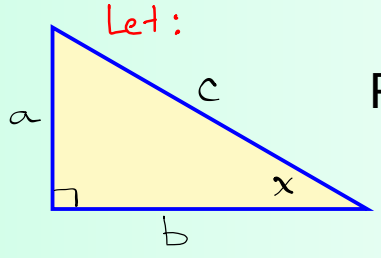
Reciprocal Identities:

$\sin x = \frac{1}{\csc x}$ $\quad \sec x = \frac{1}{\cos x}$ $\quad \tan x = \frac{1}{\cot x}$

$\csc x = \frac{1}{\sin x}$ $\quad \cos x = \frac{1}{\sec x}$ $\quad \cot x = \frac{1}{\tan x}$

Tangent and Cotangent Identities:

$\tan x = \frac{\sin x}{\cos x}$ $\quad \cot x = \frac{\cos x}{\sin x}$



Prove: $\tan x = \frac{\sin x}{\cos x}$

$\tan x = \frac{\frac{a}{c}}{\frac{b}{c}}$

$\tan x = \frac{a}{c} \cdot \frac{c}{b}$

$\tan x = \frac{a}{b}$

$\tan x = \tan x$

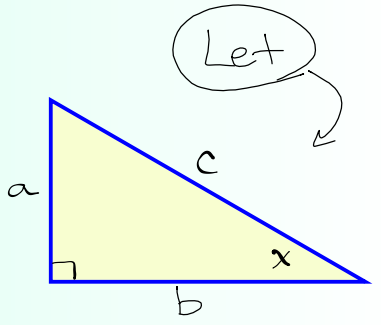
There are 3 Pythagorean Identities:

The first one: $\sin^2 x + \cos^2 x = 1$

Try to figure out the other two:

$1 + \tan^2 x = ?$ $\sec^2 x$

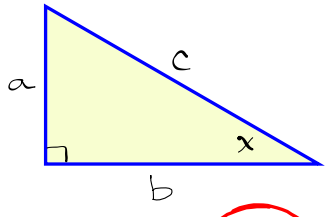
$1 + \cot^2 x = ?$ $\csc^2 x$



Be able to prove all of them! (Note: It is bad form to prove a Pythagorean Identity using another Pythagorean Identity!!)

Prove:

$1 + \tan^2 x = \sec^2 x$



$1 + \left(\frac{a}{b}\right)^2 = \sec^2 x$

$\frac{b^2}{b^2} + \frac{a^2}{b^2} =$

$\frac{a^2 + b^2}{b^2} =$

$\frac{c^2}{b^2} =$

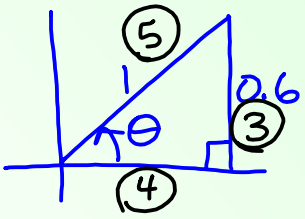
$\left(\frac{c}{b}\right)^2 =$

$\sec^2 x = \sec^2 x$

$\sec \rightarrow \frac{\text{hyp}}{\text{adj}}$

Let θ be acute.

If $\sin\theta = 0.6$ Find the other 5 trig functions of θ.



$\frac{6 \div 2}{10 \div 2}$

$\cos\theta = \frac{4}{5}$ $\quad \csc\theta = \frac{5}{3}$

$\tan\theta = \frac{3}{4}$ $\quad \sec\theta = \frac{5}{4}$

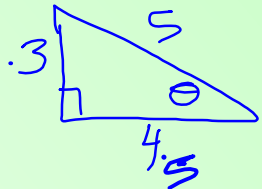
$\cot\theta = \frac{4}{3}$

Find θ in degrees, to nearest 10th of a second.

$\theta \approx 36^\circ\ 52'\ 11.6''$

Let θ be acute.

If $\sin\theta = 0.6$ $= \frac{6}{10} = \frac{3}{5}$ Find the other 5 trig functions of θ.



$\csc\theta = \frac{5}{3}$

$\sec\theta = \frac{5}{4}$

$\cot\theta = \frac{4}{3}$

$\sin^2\theta + \cos^2\theta = 1$

$(0.6)^2 + (\cos\theta)^2 = 1$

$0.36 + (\cos\theta)^2 = 1$

$\sqrt{(\cos\theta)^2} = \sqrt{0.64}$

$\cos\theta = \pm 0.8$

$\cos\theta = \frac{4}{5}$ *

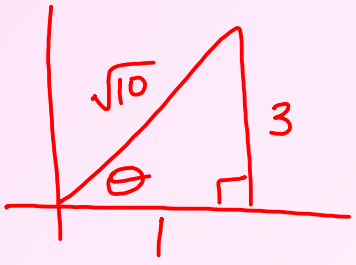
$\tan\theta = \frac{3}{4}$

Find θ in degrees, to nearest 10th of a second.

$\theta = \sin^{-1}(0.6)$

$\theta \approx 36^\circ\ 52'\ 11.6''$

If $\tan\theta = 3$, find the other 5 trig functions of θ.



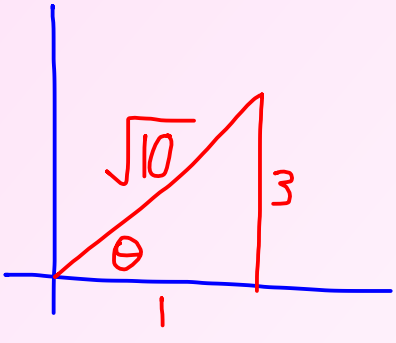
$\sin\theta =$ $\quad$ $\csc\theta =$

$\cos\theta =$ $\quad$ $\sec\theta =$

$\cot\theta =$

Find θ in radians
(4 decimal places)

If $\tan\theta = \frac{3}{1}$, find the other 5 trig functions of θ.



$\sin\theta = \frac{3}{\sqrt{10}} = \frac{3\sqrt{10}}{10}$ $\quad$ $\csc\theta = \frac{\sqrt{10}}{3}$

$\cos\theta = \frac{1}{\sqrt{10}} = \frac{\sqrt{10}}{10}$ $\quad$ $\sec\theta = \sqrt{10}$

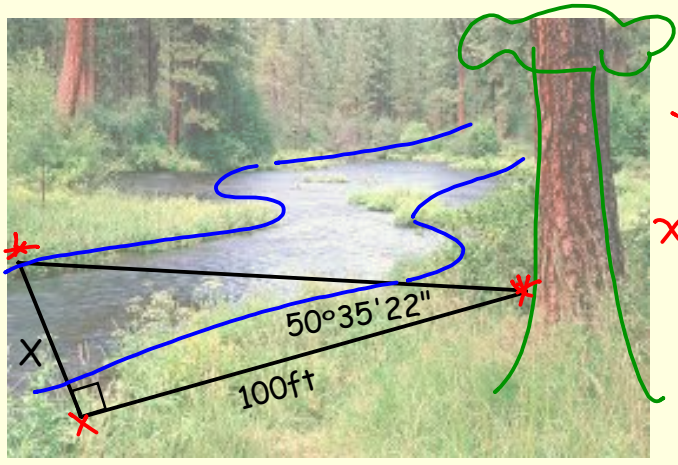
$\cot\theta = \frac{1}{3}$

Find θ in radians
(4 decimal places)

$\theta = \tan^{-1} 3$

≈ 1.2490

A surveyor can measure the width of a river without getting wet by using trig relationships. Find x to nearest 10th of a foot.



$\tan 50°35'22'' = \frac{x}{100}$

$x = 100(\quad)$

HW: PC book p. 329 boxed and #41

Unit Circle Quiz: Tuesday

HW Week 5: Wednesday
SL p. 312 (2 days) and PC p. 309, 319

Quiz Thursday: SL 9.1, 9.7
PC 5.1 - 5.4